

CLAIMS

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1. A powder coating composition in which powder particles are an agglomerate of individual particulate components fused or bonded together into composite particles, wherein the individual particulate components comprise
- (1) two or more coloured base components having a Dv.99 of no more than 30µm, at least one of which components is *per se* non-film-forming and comprises one or more colouring agents dispersed in a suitable carrier, and
- (2) one or more uncoloured film-forming components, wherein at least one component (2a) (i) has a Dv.99 that is more than 20µm and (ii) has a higher Dv.99 or a higher Dv.50 than coloured base components (1) taken together,
- the ratio of coloured base components to uncoloured film-forming component(s) in the composition being in the range of from 1:99 to 60:40 by weight.
2. A powder coating composition as claimed in claim 1, wherein the uncoloured film-forming component or components (2a) are present in an amount of at least 10% by weight of components (1) and (2).
3. A powder coating composition as claimed in claim 1 or claim 2, wherein there is no more than 30% by weight, calculated on the weight of the total of components (1) and (2), of uncoloured film-forming component(s) having a Dv.99 (i) that is no higher than the Dv.99 of the coloured base components taken together, and (ii) that is less than 20µm.

4. A powder coating composition in which powder particles are an agglomerate of individual particulate components fused or bonded together into composite particles, wherein the individual particulate components comprise
- (1) two or more coloured film-forming base components each having a Dv.99 of no more than $30\mu\text{m}$ (at least one of which components is *per se* non-film-forming and comprises one or more colouring agents dispersed in a suitable carrier) in an amount of from 1 to 60% by weight of the total of components (1) and (2), and
- (2)(a) one or more uncoloured film-forming components each having a Dv.99 of more than $20\mu\text{m}$ and each having a higher Dv.99 and/or a higher Dv.50 than the coloured base components (1) taken together, in an amount of from 10 to 99% by weight of the total of components (1) and (2), and, if desired,
- (b) one or more other uncoloured film-forming components, in an amount of up to 30% by weight of the total of components (1) and (2).

5. A powder coating composition as claimed in any one of claims 1 to 4, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.99 of no more than $90\mu\text{m}$.

6. A powder coating composition as claimed in any one of claims 1 to 5, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components has a Dv.99 of at least $30\mu\text{m}$.

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7. A powder coating composition as claimed in claim 6, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.99 of at least 35 μ m.

5 8. A powder coating composition as claimed in claim 7, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.99 of at least 40 μ m.

10 9. A powder coating composition as claimed in any one of claims 1 to 8, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.90 of at least 14 μ m.

15 10. A powder coating composition as claimed in claim 9, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.90 of at least 18 μ m.

20 11. A powder coating composition as claimed in any one of claims 1 to 10; wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.90 of no more than 75 μ m.

12. A powder coating composition as claimed in any one of claims 8 to 11, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.99 in the range of from 50 to 65 μ m.

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13. A powder coating composition as claimed in any one of claims 1 to 12, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.50 in the range of from 5 to 45 μ m.

14. A powder coating composition as claimed in claim 13, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.50 of at least 8 μ m.

15. A powder coating composition as claimed in claim 14, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.99 of at least 40 μ m and a Dv.50 of at least 10 μ m

16. A powder coating composition as claimed in claim 14 or claim 15, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components (2a) has a Dv.50 in the range of from 12 to 30 μ m.

17. A powder coating composition as claimed in any one of claims 1 to 16, wherein the coloured film-forming base components have a Dv.99 in the range of from 6 to 25 μ m.

18. A powder coating composition as claimed in any one of claims 1 to 17, wherein the coloured base components have a Dv.50 of no more than 18 μ m.

19. A powder coating composition as claimed in claim 18, wherein the coloured base components have a Dv.50 of no more than 15 μ m.

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20. A powder coating composition as claimed in claim 19, wherein the coloured base components have a Dv.50 in the range of from 2 to 12µm.

21. A powder coating composition as claimed in any one of claims 1 to 20, wherein the coloured base components contain in total from 5 to 75 weight % of pigment, calculated on the total weight of those components.

22. A powder coating composition as claimed in any one of claims 1 to 21, wherein the coloured base components contain in total from 0.5 to 50 weight % of pigment, calculated on the total weight of the composition.

23. A powder coating composition as claimed in any one of claims 1 to 22, wherein the coloured base components include at least one coloured film-forming component compatible with the coloured non-film-forming base component(s).

24. A powder coating composition as claimed in claim 23, wherein the uncoloured film-forming component (2a) or at least one of the uncoloured film-forming components listed under (2a) and (2b) is compatible with the coloured base components (1) during film-formation.

25. A powder coating composition as claimed in claim 23 or claim 24, wherein the uncoloured film-forming component (2a) or at least one of the uncoloured film-forming components listed under (2a) and (2b) is incompatible with the coloured base component(s) (1) or becomes incompatible therewith during film-formation.

26. A powder coating composition as claimed in any one of claims 1 to 25 claim 20, wherein the coloured film-forming component(s) comprise a polyester.

27. A powder coating composition as claimed in any one of claims 1 to 26, which includes two uncoloured film-forming components, one that is compatible with the coloured base components and one that is incompatible therewith or that becomes incompatible therewith during film-formation.

28. A powder coating composition as claimed in any one of claims 1 to 27, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components comprises a polyester.

29. A powder coating composition as claimed in claim 27, wherein each of the uncoloured film-forming components comprises a polyester, the polyesters differing in functionality.

30. A powder coating composition as claimed in any one of claims 26 to 29, which includes two polyester film-forming components containing different curing agents, one of those being an epoxy curing agent or a co-reactable epoxy resin.

31. A powder coating composition as claimed in any one of claims 1 to 30, which includes an uncoloured film-forming component (2a) or (2b) which is itself an agglomerate of an uncoloured film-forming component fused or bonded to form composite particles with a non-film-forming component.

32. A powder coating composition as claimed in any one of claims 1 to 31, wherein component (2a) or (2b) includes a texturing additive.

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33. A powder coating composition as claimed in claim 31, wherein the agglomerated component (2a) or (2b) includes mica.

34. A powder coating composition as claimed in any one of claims 1 to 33, wherein the ratio of coloured base components (1) to uncoloured film-forming component(s) (2a) is in the range of from 1:99 to 50:50 by weight.

35. A powder coating composition as claimed in claim 34, wherein the ratio of coloured base components (1) to uncoloured film-forming component(s) (2a) is in the range of from 1:99 to 40:60 by weight.

36. A powder coating composition as claimed in claim 35, wherein the ratio of coloured base components (1) to uncoloured film-forming component(s) (2a) is in the range of from 1:99 to 30:70 by weight.

37. A powder coating composition as claimed in claim 36, wherein the ratio of coloured film-forming base components (1) to uncoloured film-forming component(s) (2a) is in the range of from 5:95 to 30:70.

38. A powder coating composition as claimed in any one of claims 1 to 37, wherein the uncoloured film-forming component or components (2) are present in an amount of at least 50% by weight of the total of components (1) and (2).

39. A powder coating composition as claimed in claim 38, wherein the uncoloured film-forming component or components (2) are present in an amount of at least 60% by weight of the total of components (1) and (2).

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40. A powder coating composition as claimed in claim 39, wherein the uncoloured film-forming component or components (2) are present in an amount of at least 70% by weight of the total of components (1) and (2).

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41. A powder coating composition as claimed in any one of claims 2 to 40, wherein the uncoloured film-forming component or components (2a) are present in an amount of at least 20% by weight of the total of components (1) and (2).

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42. A powder coating composition as claimed in claim 41, wherein the uncoloured film-forming component or components (2a) are present in an amount of at least 30% by weight of the total of components (1) and (2).

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43. A powder coating composition as claimed in claim 42, wherein the uncoloured film-forming component or components (2a) are present in an amount of at least 40% by weight of the total of components (1) and (2).

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44. A powder coating composition as claimed in claim 43, wherein the uncoloured film-forming component or components (2a) are present in an amount of at least 50% by weight of the total of components (1) and (2).

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45. A powder coating composition as claimed in claim 44, wherein the uncoloured film-forming component or components (2a) are present in an amount of at least 60% by weight of the total of components (1) and (2).

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46. A powder coating composition as claimed in any one of claims 1 to 45, wherein there is no more than 15% by weight, calculated on the weight of total of components (1) and (2), of uncoloured film-forming component(s) (2b).

5 47. A powder coating composition as claimed in any one of claims 1 to 46, wherein the individual particulate components of the agglomerate include one or more other non-film-forming components (3).

10 48. A powder coating composition as claimed in claim 47, wherein the individual particulate components of the agglomerate include a texturing agent (3).

49. A powder coating composition as claimed in claim 47 or claim 48, wherein the other non-film-forming component or components constitute up to 50% by weight of the total particulate components of the composition.

15 50. A kit comprising the following separate particulate components for agglomerating into powder coating compositions for the preparation of powder coatings in a number of different colours:

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- a plurality of coloured base components, each with a Dv.99 of no more than 30µm, at least one of which components is *per se* non-film-forming and comprises one or more colouring agents dispersed in a suitable carrier, and
 - one or more uncoloured film-forming components each having a higher Dv.99 and/or a higher Dv.50, each Dv.99 being more than 20µm.

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51. A kit as claimed in claim 50, wherein the uncoloured film-forming component or at least one of the uncoloured film-forming components has a Dv.99 of no more than 90µm.

52. A kit as claimed in claim 50 or claim 51, which includes at least 7 differently coloured base components.

53. A kit as claimed in any one of claims 50 to 52, which includes an uncoloured film-forming component that is compatible during film-formation with the coloured base components, and an uncoloured film-forming component that is incompatible with the coloured base components or that becomes incompatible therewith during film-formation.

54. A kit comprising the following separate components for the manufacture of agglomerated powder coating compositions for the preparation of powder coatings in a number of different colours:

- at least 7 differently coloured base components, at least one of which components is *per se* non-film-forming and comprises one or more colouring agents dispersed in a suitable carrier,
- an uncoloured film-forming component that is compatible with the coloured base components and remains compatible during film-formation and that has a Dv.99 of more than 20µm and no more than 90µm, and
- an uncoloured film-forming component that is incompatible with the coloured base components or that becomes incompatible therewith during film-formation, and that has a Dv.99 of more than 20µm and no more than 90µm.

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55. A kit as claimed in claim 54, which includes means for comminution of the coloured base components to a powder having Dv.99 of no more than 30 μ m.

56. A kit as claimed in any one of claims 50 to 55, wherein the different components are as specified in any one of claims 2 to 33 and 47 to 49.

57. A kit as claimed in any one of claims 50 to 56, which includes at least 3 uncoloured film-forming components.

58. A kit as claimed in any one of claims 50 to 57, which includes means for agglomerating the components to produce a fluidisable powder.

59. A process for the preparation of a powder coating composition as claimed in any one of claims 1 to 49, which comprises providing the specified two or more coloured base components (1) and the one or more specified uncoloured film-forming components (2a) and if desired one or more other components selected from other uncoloured film-forming components (2b) and other non-film-forming components (3), in the specified proportions, and mixing and agglomerating the components into composite particles such that the composition is air-fluidisable and can be applied to a substrate by electrostatic spray.

60. A process for the preparation of a powder coating composition as claimed in claim 1 from a kit comprising a plurality of differently coloured base components, at least one of which components is *per se* non-film-forming and comprises one or more colouring agents dispersed in a suitable carrier, and one or more uncoloured film-forming components having a Dv.99 of more than 40 μ m, which

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comprises comminuting at least two of the coloured base components to provide powders having a Dv.99 of no more than 30µm, and mixing and agglomerating the two or more comminuted coloured base components and at least one of the specified uncoloured film-forming components having a Dv.99 or a Dv.50 higher than the Dv.99 or Dv.50 respectively of the comminuted coloured base components taken together, in the proportions specified in claim 1 to form composite particles, such that the composition is air-fluidisable and can be applied to a substrate by electrostatic spray.

61. A powder coating composition when prepared by a process as claimed in claim 59 or claim 60.

62. A process for forming a coating on a substrate, which comprises applying an agglomerated composition as claimed in any one of claims 1 to 49 or claim 61 to a substrate, and heating the applied composition to form a continuous coating.

63. A substrate coated by a process as claimed in claim 62.

64. A powder coating composition in which powder particles are an agglomerate of individual particulate components fused or bonded together into composite particles, wherein the individual particulate components comprise a first film-forming component, a coloured non-film-forming base component having a Dv.99 of no more than 30µm and comprising one or more colouring agents dispersed in a suitable carrier, and if desired one or more other components selected from film-forming and non-film-forming components.

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65. A powder coating composition as claimed in claim 64, wherein the first film-forming component is uncoloured.

66. A powder coating composition as claimed in claim 65, wherein the uncoloured film-forming component has a Dv.99 that is more than 20µm and no more than 90µm and is higher than the coloured non-film-forming base component.

67. A powder coating composition in which powder particles are an agglomerate of individual particulate components fused or bonded together into composite particles, wherein the individual particulate components comprise

(i) a coloured non-film-forming base component having a Dv.99 of no more than 30µm and comprising one or more colouring agents dispersed in a suitable carrier, or two or more such components, and

(ii) an uncoloured film-forming component compatible with component (i) and having a Dv.99 that is more than 20µm and no more than 90µm, and that is higher than the Dv.99 of component (i) or, when there is more than one such component, of those components taken together, or two or more such components,

and, if desired,

(iii) a coloured film-forming base component compatible with components (i) and (ii) and having a Dv.99 of no more than 30µm, or two or more such components,

and/or

(iv) an uncoloured film-forming component having a Dv.99 of more than 20µm and no more than 90µm, that is incompatible with components (i) and (ii) or that becomes incompatible therewith during film-formation,

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a₂ and optionally one or more other components selected from film-forming and non-film-forming components.

68. A powder coating composition as claimed in claim 67, wherein the
5 pigment content of the composition is at least 0.5% by weight and the composition comprises at least 50% by weight of film-forming component(s).

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